A. Friedmann.

Steam Pump.

No. 88,620. Patented Apr. 6, 1869.

Fig. 1

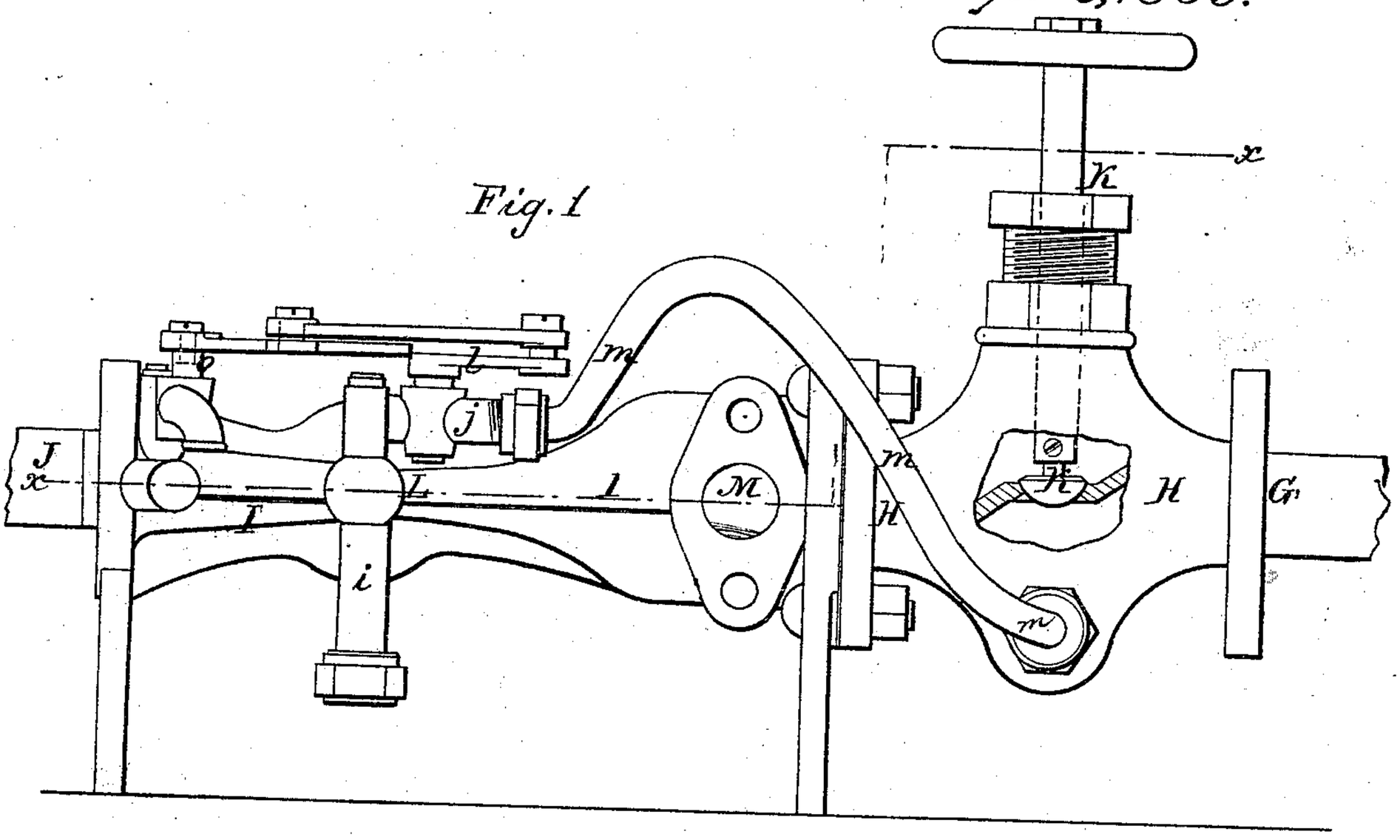

Fig. 2

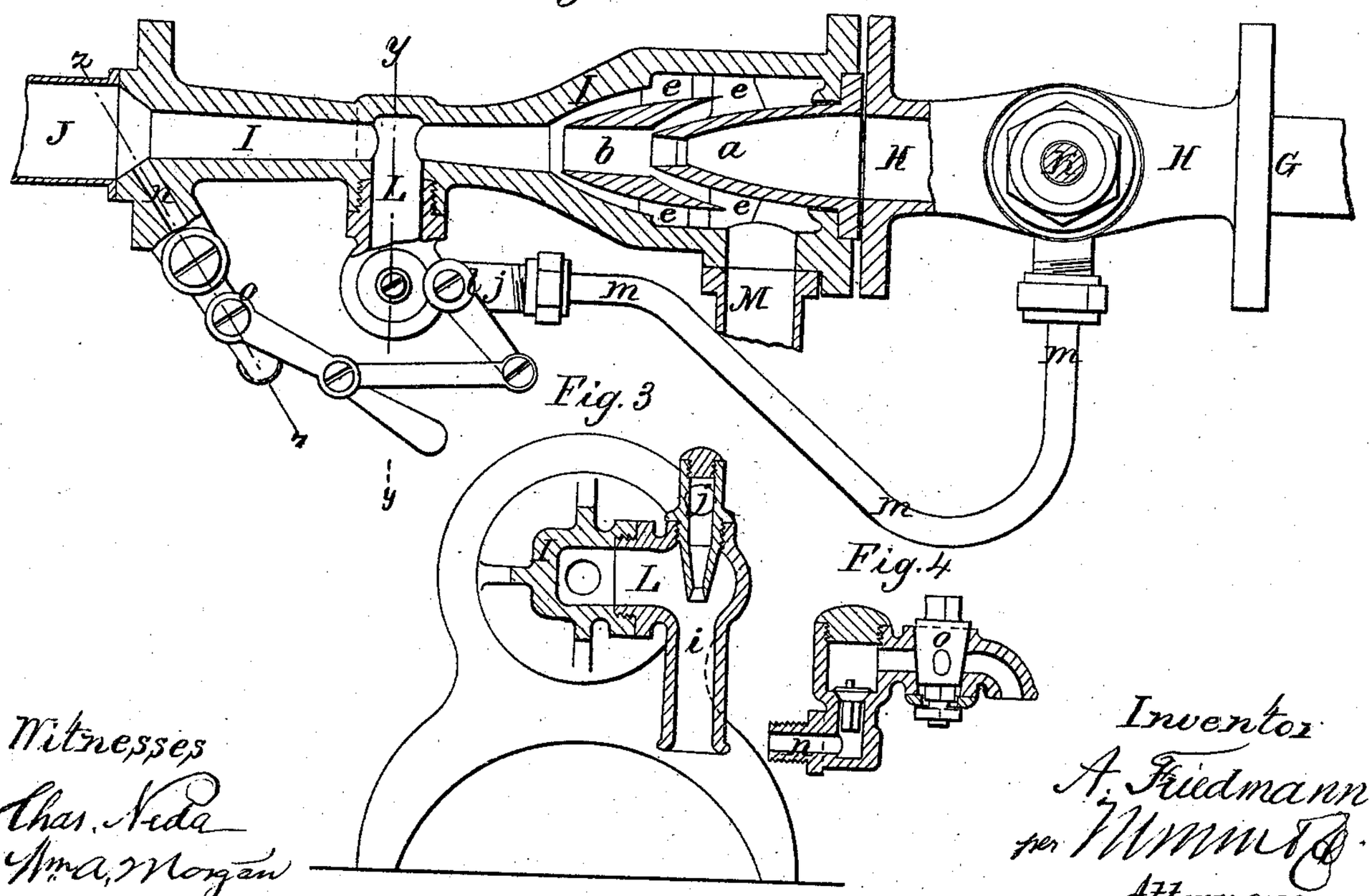

Fig. 3

Fig. 4

Witnesses
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UNITED STATES PATENT OFFICE.

ALEXANDER FRIEDMANN, OF VIENNA, AUSTRIA.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. **88,620**, dated April 6, 1869.

To all whom it may concern:

Be it known that I, ALEXANDER FRIEDMANN, of Vienna, in Austria, have invented a new and Improved Apparatus for Raising and Forcing Water and for Feeding Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a new pump for elevating or forcing water by means of steam, and has for its object to reduce the shock produced by suddenly bringing the steam in contact with the water.

The condensation of steam is, in such pumps, generally so sudden, and the consequent reaction so great, that much power is thereby lost.

My invention effects a very gradual condensation, and at the same time, also, a gradual expansion of the steam-column.

In the accompanying sheet of drawings, Figure 1 is a side elevation of my improved suction-pump. Fig. 2 is a horizontal section of the same, taken on the plane of the line *x x*, Fig. 1. Fig. 3 is a detail vertical transverse section of the same, taken on the plane of the line *y y*, Fig. 2. Fig. 4 is a detail vertical section of the same, taken on the plane of the line *z z*, Fig. 2.

Similar letters of reference indicate like parts.

The figures in the drawing show a boiler-feed pump which is made according to the principles laid down by me in the above.

With regard to the boiler-feed pumps, the mechanical effect should be increased, not only to be able to feed faster, but also because these pumps should be able to fulfill their function with certainty within very wide or narrow limits as regards the temperature of the feed-water, for almost everywhere the feed-water is taken from heating-reservoirs or condensers, and is at times very hot.

It is further necessary that the feed-pumps be able to work with accuracy within a great space employed for the generation of the elastic force of steam, without being compelled continually to regulate the same, for this continual regulation would demand more attention and skill on the part of the attendant than he would be able to apply. These conditions are realized by my boiler-feed pumps, which I now describe.

G is the pipe through which the boiler-feed steam passes into the front body H of the pump.

b is an intermediate pipe, having the shape and dimensions according to the principles laid down as above. In order to keep the axis of this pipe in the center, which is of the utmost importance, I provide it with four (more or less) ribs, *e e*, by which it is fixed in the pipe I.

I is the last or end pipe, which, in its prolongation, is connected with the pressure-pipe J, and which, at the same time, forms the back part of the pump.

To the pipe H is attached a steam-cock, K, in suitable manner, and to the back part I of the pump is secured a water-cock, M, by means of which it is connected with the suction-pipe.

The principal form of the pipe I is that of two obtuse cones, which meet at their smallest diameter, and of which the one placed near the intermediate pipe *b* is pierced, near its smallest cross-section, by a cylinder, L, placed at right angles to it. L is closed at one end and open at the other, as shown in Fig. 2.

At the open end of the cylinder L the suction-rose *i* is secured, which rose has to suck up the water into the body of the pump before the pump is set in motion. The suction-rose consists of a small cylinder-pipe, of which one end is open, while into the upper end a small air-pipe, *j*, enters, communicating, by means of a cock, *l*, with a small pipe, *m*, which latter is connected with the pipe H beyond the steam-cock, so as always to be filled with steam.

At the end of the pipe I toward the side of the pressure-pipe a hole, *n*, is bored, in which a small cock, *o*, is fastened, (shown in detail in Fig. 4,) and which I call "safety-cock." This is a small common cock, supplied with a small valve opening outward.

The handle of the safety-cock is coupled with that of the cock *l* of the suction-rose *i*, as shown in Fig. 2, so that these two small cocks open and shut together, and simultaneously. The pressure-valve *l* must be placed in the course of the pressure-pipe *j*.

The working of the pump is as follows: The water-cock M is first opened, then the safety-

cock *n*, and the little cock *l* of the suction-rose *i*. This produces the effect that the steam, approaching through the small pipe *m*, rushes through the vertical cylinder of the suction-rose *i*, absorbing the air from all the pipes, and creating a vacuum, by which means the water is driven into the interior of the pump.

If the water has once risen into the pump, which is easily noticed, because the noise made during the suction of the air then ceases, the steam-cock K is opened, and some seconds later the two small coupled cocks are closed, and the pump is in motion.

The steam escaping from the steam-outlet *a* is partially condensed in the water, which it meets at the moment it issues from the steam-outlet *a* to its entrance into the intermediate pipe *b*.

The opening of the intermediate pipe is smaller than that of the one following, which, in this case, is the pipe I.

In its passage from *b* to I the steam and water mixed in the intermediate pipe performs the second part of its entire work in again attracting water by suction. In this manner the mixture of steam and water is condensed as required while passing through the first part of the pressure-pipe I, and passes, as water-jet, in the second cone of the end pipe I, through the pipe J, into the water-cock of the boiler.

The outer end of the end pipe I is enlarged, so as to prevent water from issuing sidewise from the cylinder L while in operation.

The requisite quantity of water to make the pump work best is regulated automatically by the intermediate pipe *b*, because the jet takes with it just as much water as it can draw.

If the level of the water-reservoir (whether condenser or heater) is higher than the axis of the pump, or if the pump can be placed so that the steam-outlet of the pump is lower than the level of the feed-water, so that when the water-cock is open the water can run down into the interior of the pump, then the suction-rose *i* is not required; and, instead of the safety-cock, quite a small common cock, without valve, may be used, screwed on so as to lengthen the hole *n* at the end of the pipe I; and, instead of the suction-rose *i*, a small knee-pipe would be used, in order to let off the water from the pump while setting it in motion. The pump would, in that case, be set in motion in the following manner: First, the small safety-cock is opened, then the water-cock, and, lastly, the steam-cock. A few seconds later the small safety-cock is turned off or closed, and the pump gets into full action.

The action of the small safety-cock is of great importance. It allows the water that is pressed forward in setting the pump in motion to attain gradually the requisite degree of force to raise the pressure-valve, so that at first a part of the water can escape through the small opening *n* at the end of the pipe I, which corresponds with the small cock. Thereby not only the shocks on setting the pump in motion will be avoided, but also a too vehement reaction upon the steam of the steam-outlet will be prevented, and hence, the safety-cock once turned, the steam sets the pump in motion without ever rushing back to press into the feed-reservoir, instead of feeding the water into the boiler. Hence the small cock *o* insures great safety for setting the pump in regular action, and I therefore call it "safety-cock."

My pumps can be placed horizontally as well as vertically without occasioning any change in their action.

The pumps may be modified in numerous ways, always retaining the main principle of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The intermediate pipes *a b*, constructed, as described, with the wings *e*, and arranged, with relation to each other and the pipe I, as herein set forth.

2. The mouth-piece *a*, formed on the steam-pipe, when arranged in combination with the intermediate pipe *b*, all substantially as herein shown and described.

3. The safety-cock *o*, applied to the end of the pump, substantially as herein shown and specified.

4. The cylinder L, suction-rose *i*, valve *l*, and pipe *m*, as specified.

5. The safety-cock *o*, connected with the suction-cock *l*, substantially as set forth.

ALEX. FRIEDMANN.

Witnesses:

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